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An Analysis of Urbanisation Sustainability Effect from High-Speed Rail in Honshu Area [†]

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Several decades of the High-Speed Rail (HSR) in Japan have generated direct impacts on Japanese's life regarding reducing short time travel, enabling newly accessible areas, and increasing transport market. Those impacts have been continually led to indirect impacts on Japanese's society regarding population dynamics, workforces, and property price. The paper aims to understand the impact of HSR system along the urbanisation that can be a guideline to the urban developer for taking more benefit from the HSR.

The research focused on the Honshu Island, which is the mainland in Japan, represents more than 60 percent of the whole population and contains 34 prefectures. It composes of eight HSR lines from three railway operators, which is JR East, JR Central, and JR West, servicing in the Honshu Island. The trend of passenger using HSR service based on the travel distances that showed HSR gained higher market share than other modes of transportation at a distance 300–1000 km and mostly get the highest at 69.1% at a distance 500–700 km [1–3].

However, the research found that there is imbalance service in Honshu areas due to there are no HSR services in some prefectures such as Yamanashi and Chiba. Therefore, this paper expects to measure the impact of HSR network by comparing between the prefecture with and without HSR services. The results are expected to identify the indirect effects regarding population density and land pricing from the HSR network.

The study design four cases studies that compare one prefecture with the HSR services with two prefectures without the HSR service as shows in Table 1. The main criteria to match up prefectures is to select from the nearby prefectures as possible.

Table 1. The summarisation of the case study using in this research.

| Case Studies | Prefecture with the HSR Service | Prefecture without the HSR Service |
|--------------|---------------------------------|------------------------------------|
| Case I | Miyagi | Chiba and Yamanashi |
| Case II | Tokyo | Chiba and Yamanashi |
| Case III | Kyoto | Shimane and Tottori |
| Case IV | Osaka | Shimane and Tottori |

An analysis of parts can be split into two parts, which is the one-way ANOVA analysis and LSD (Least Significant Different) analysis. Concerning the ANOVA analysis, it applies to measure the relationship between each sample within the group. The null hypothesis (H_0) is a stated for following general assumption that there is no relation in mean (μ) within the case study. The H_0 means the Shinkansen network has no impacted on the land price caused by those means are equal. On the other hand, the alternative hypothesis (H_1) implied that the means are not all similar. Based

on this study, the acceptance of H_1 can be interpreted as the Shinkansen network has effected on land price. Then, the LSD analysis aims to justify all possible pair-wise comparisons of means comprising a factor after analysing of ANOVA, and its results showed at least one group differs from other (Williams and Abdi 2010). The outcomes can genuinely identify the similarity or dissimilarity between each pair of the sample in a case study. Also, it can justify how the impact of HSR on population dynamic and land price in the area with and without HSR station.

Regarding with the data collection, the study takes the population data in Japan during 2001–2014 where the land price data is received since 1983. In term of land pricing, the results found that HSR has effected on the land prices but, the volume of impact depends on each prefecture. In the metropolitan areas, an apparently different from the average land price illustrated the prefectures with HSR station took advantages over the areas without HSR station. Besides, the areas surrounded by HSR stations have been turned to economics zones. In the urban areas, on the other hand, HSR has shown slightly impact on majority cities such as Tokyo due to the metropolitan cities may grow up by other factors such as new business, and other facilities. Another part, the impact of HSR service on population dynamics also shows Shinkansen network had high impacts on population dynamics, especially in rural areas.

In conclusion, the analysis along two stages of this study found that HSR has impacts on urbanisation in Japan but, the volume of effect relies on characteristics of the prefecture. Among ambiguous answers of has HSR impacted on Japanese society, the research can affirm that the Shinkansen network reflects its benefit on the rural than urban areas.

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